This listing of claims will replace all prior versions, and listings of claims in the application.

LISTING OF CLAIMS:

1. (currently amended) A system for sensing position comprising:

~~a~~ at least one transmitting device operable to transmit a radio signal and wherein said radio signal of each of said transmitting devices is spread-spectrum coded and has a unique pseudo-noise (PN) code signal structure using longer PN-codes;

at least four processing channels each comprising a pair of ~~at least two~~ receiver units in spaced relation to each other and ~~each~~ receiver unit operable to receive a different version of the radio signal in the form of a pseudo-noise code modulated carrier signal; and,

an electronic circuit coupled to the ~~receiver units~~ processing channels and operable to determine a location of the radio transmitting device in relation to the receiver units based on a ~~comparison between each the different version of the radio signal~~ measurement of the radiated-signal-strength(RSS) and of the carrier signal phase delay between each of the different versions of the radio signal for each pair of receiver units;

said electronic circuit further comprising an analog-to-digital converter (ADC) for each processing channel operable to over-sample the radio signal by a factor at least five times faster than the PN chip rate of said radio signal.

2. (currently amended) The system of claim 1 further comprising at least one additional radio transmitting device, each of the radio transmitting devices operable to transmit a radio signal orthogonal to each of the other radio signals transmitted by the other ~~the~~ radio transmitting devices, the electronic circuit further operable to distinguish each of the radio transmitting devices from the other radio transmitting devices based on the orthogonal radio signals, the electronic circuit being further operable to determine a location of the radio transmitting devices substantially simultaneously based on said signal structure of the radio signal.

3. (original) The system according to claim 2 wherein an antenna associated with each of the receiver units are spaced apart at a distance of about one-half of a wavelength of the radio signal.

4. (currently amended) The system according to claim 2 wherein ~~the radio signals are based on a spread spectrum technology~~ at least one of said receiver units of one of said pairs of receiver units is shared with another one of said pairs of receiver units.

5. (currently amended) The system according to claim [4] 1 wherein the spread spectrum technology is selected from the group consisting of direct sequence spread spectrum signals, frequency hopping spread spectrum signals, time hopping spread spectrum signals, linear frequency sweeping (chirp) signals, and hybrid signals.

6. (original) The system according to claim 2 wherein the radio signals are based on code division multiple access (CDMA) and the orthogonal codes are unique pseudo-noise (PN) codewords assigned to each of the transmitting devices.

7. (cancelled).

8. (cancelled).

9. (original) The system according to claim 1 wherein the transmitting device is affixed to a pointing device and the electronic circuit is coupled with an input device on a personal computer having a display device and such that the pointing device is operable to move a cursor on the display device.

10. (currently amended) The system according to claim 9 wherein the pointing device includes at least one button for user actuation and the radio signals ~~is based on code division multiple access (CDMA) and transmitting device is assigned a pseudo-noise (PN) codeword~~ transmitted by the affixed transmitting device is assigned to said pointing device, and wherein an actuation of the

button is transmitted to the receiver units via using one of the techniques of inverting the PN codeword for at least one bit-period, and switching to a different PN codeword for at least one bit period.

11. (original) The system according to claim 1 wherein a power supply incorporated into the transmitting device is selected from the group consisting of a battery, a solar cell, a coil operable to receive energy from an EM powering field radiating proximal to the power supply, and a coil operable to induce electrical energy from a magnetic field by mechanical motion.

12. (original) The system according to claim 1 comprising only two of the receiver units and the location is expressed in a single-dimension.

13. (currently amended) The system according to claim 1 wherein at least one of the transmitting devices and the receiver units remain fixed during operation.

14. (currently amended) The system according to claim 1 comprising three of the receiver units arranged in a triangular format, the electronic circuit operable to receive a first input from a first pairing of the three receiver units and further operable to receive a second input from a second pairing of the three receiver units, the pairings having only one of the receiver units in common, the electronic circuit further operable to determine a two dimensional position of the transmitting device based on a comparison of the first input and the second input.

15. (original) The system according to claim 1 comprising four of the receiver units arranged in a rectangular format, the electronic circuit operable to receive four separate inputs from four respective pairings of the four receiver units, the electronic circuit further operable to determine a three dimensional position of the transmitting device based on a comparison of the separate inputs.

16. (original) The system according to claim 15 wherein the rectangular format is a plane arranged around a periphery of a computer display.

17. (original) The system according to claim 1 comprising eight of the receiver units arranged in a cube, the electronic circuit operable to receive eight separate inputs from eight respective pairings of the eight receiver units, the electronic circuit further operable to determine a three dimensional position of the transmitting device in relation to the cube based on a comparison of the separate inputs.

18. (original) The system according to claim 1 wherein the electronic circuit comprises a channel pair processor connected to the receiver units, a detector & position calculator connected to the channel pair processor, and an output device for presenting the location to an electronic peripheral attachable to the output device.

19. (original) The system according to claim 1 wherein the electronic peripheral is a computer and a display device, the computer being configured to present a representation of the location on the display device.

20. (original) The system according to claim 18 wherein the channel pair processor comprises an I/Q demodulator coupled to the receiver unit to receive input therefrom, the channel pair processor further comprising an analog-to-digital converter coupled to the I/Q demodulator for converting analog signals therefrom to digital signals; the channel pair processor further comprising a phase data calculator for determining amplitude and phase information from the digital signals and for outputting the amplitude and phase information to the detector & position calculator.

21. (original) The system according to claim 20 wherein the system is based on CDMA and the detector & position calculator comprises: a CDMA processor for receiving the amplitude and phase information; a transmitter detector coupled to the CDMA processor and for determining an identity of the transmitting device; a data signal extractor coupled to the transmitter detector for determining any specific data embedded in the radio signal respective to the transmitting device; and, a device locator coupled to the data signal extractor for determining a position of the transmitting device.

22. (original) The system according to claim 1 wherein the transmitter device comprises a power supply, orthogonal code generator, a VCO generator interconnected by an RF signal modulator; the transmitter device further comprising a pulse shaping module for shaping a waveform output from the RF signal modulator; the transmitter device further comprising an antenna connected to an output of the pulse shaping modulator for outputting the radio frequency.

23. (original) The system according to claim 22 wherein the orthogonal code generator generates PN codes and is comprised of a PN-code chip coupled to a microprocessor, the PN-code chip for instructing the microprocessor which PN code is to be generated for the transmitting device.

24. (original) The system according to claim 23 wherein the orthogonal code generator further comprises a switch for selectively changing the PN-code to another PN-code when the switch is activated.

25. (original) The system according to claim 1 wherein the transmitting device is incorporated into a computer interface selected from the group consisting of a mouse, a tilt-joystick, a pointer controller, a six-degree-of-freedom interface, and a gesture interface.

26. (original) The system according to claim 1 wherein the transmitting device is incorporated into a surgical instrument.

27. (original) The system according to claim 1 wherein the transmitting device is incorporated into an industrial robot.

28. (original) The system according to claim 1 wherein the receiver unit comprises an antenna and a receiver element.

29. (original) The system according to claim 1 wherein the receiver element comprises a low-noise amplifier connected to the antenna, a bandpass filter connected to the low-noise amplifier, and an intermediate frequency amplifier connected to the bandpass filter for outputting to the electronic circuit.

30. (cancelled).

31. (cancelled).

32. (currently amended) A method for sensing position comprising:

~~receiving a first version of a radio signal from a transmitting device;~~

~~receiving a second version of the radio signal; and,~~

~~determining a location of the transmitting device based on a comparison of the first version and the second version~~

transmitting a radio signal by at least one transmitting device, wherein said radio signal of each of said transmitting devices is spread-spectrum coded and has a unique pseudo-noise (PN) code signal structure using longer PN codes;

processing said radio signal from said at least one transmitting device in the form of a pseudo-noise code modulated carrier signal by at least four processing channels each comprising a pair of receiver units being in spaced relation to each other, each receiving unit receiving a different version of said radio signal;

over-sampling the radio signal by a factor at least five times faster than the PN chip rate of said radio signal; and

determining a location of the transmitting device based on a comparison of the different versions of said radio signal by measuring of the radiated-signal-strength (RSS) and of the carrier phase delay between each of said different versions of said radio signal for each pair of receiver units.

33. (original) The method of claim 32 further comprising the steps of:

receiving first version of at least one additional radio signal from at least one additional radio transmitting device, the at least one additional radio signal being orthogonal to the radio signal;
receiving a second version of the at least one additional radio signal;
determining a location of the at least one transmitting device based on a comparison of the first and second versions of the at least one additional radio signal.

34. (original) The method according to claim 33 wherein antennas used to perform the receiving steps are spaced apart at a distance of about one-half of a wavelength of the radio signal.

35. (currently amended) The method according to claim 33 wherein ~~the radio signals are based on a spread spectrum technology~~ at least one of said receiver units of said pairs of receiver units is shared with another one of said pairs of receiver units.

36. (original) The method according to claim 33 wherein the spread spectrum technology is selected from the group consisting of direct sequence spread spectrum signals, frequency hopping spread spectrum signals, time hopping spread spectrum signals, linear frequency sweeping (chirp) signals, and hybrid signals.

37. (original) The method according to claim 33 wherein the radio, signals are based on code division multiple access (CDMA) and the orthogonal codes are unique pseudo-noise (PN) codewords assigned to each of the transmitting devices.

38. (cancelled).

39. (cancelled).

40. (original) The method according to claim 32 wherein the transmitting device is affixed to a pointing device and the electronic circuit is coupled with an input device on a personal computer

having a display device and such that the pointing device is operable to move a cursor on the display device.

41. (currently amended) The method according to claim ~~40~~ 32 wherein the pointing device includes at least one button for user actuation and the radio signals ~~is based on code division multiple access (CDMA) and transmitting device is assigned a pseudo-noise (PN) codeword~~ transmitted by said affixed transmitting device is assigned to said pointing device, and wherein an actuation of the button is transmitted to the receiver units via inverting the PN codeword for one bit-period.

42. (original) The method according to claim 32 wherein a power supply incorporated into the transmitting device is selected from the group consisting of a battery, a solar cell, a coil operable to receive energy from an EM powering field radiating proximal to the power supply, or a coil operable to induce electrical energy from a magnetic-field by mechanical motion.

43. – 47. (cancelled).

48. (currently amended) The system of claim 1, wherein said system is a ~~A~~ radio transmitting system for identifying and locating one or more radio transmitting devices in a radio transmitting area, including:

a signal propagating medium for conducting signals throughout the radio transmitting range;

at least one of the radio transmitting devices including means for producing a radio transmitting signal corresponding to said radio signal and coupling the signal to the propagating medium~~, the radio transmitting signal comprising a spread spectrum signal~~;

each radio transmitting signal ~~including a unique code~~ identifying the respective device by means of said unique PN-code signal structure;

signal receiving means each comprising at least one of said receiving units and being associated with the sensing area and connected to the propagating medium to receive at least one radio transmitting signal from the one or more radio transmitting devices; and,

means for decoding the radio transmitting signal to identify at least one of the radio transmitting devices.

49. (currently amended) The ~~radio transmitting~~ system of claim 48, ~~further including means for determining~~ wherein said electronic circuit is further operable to determine the position of at least one of the radio transmitting devices in the radio transmitting range.

50. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein the one or more radio transmitting devices are active devices.

51. (currently amended) The ~~radio transmitting~~ system of claim 50, further including means for generating an energy field in the propagating medium within the radio transmitting range.

52. (currently amended) The ~~radio transmitting~~ system of claim 51, wherein the energy field includes a spread spectrum signal component.

53. (currently amended) The ~~radio transmitting~~ system of claim 51, wherein each of the radio-transmitting devices includes a means to receive a signal through the EM energy field for active radio transmitting device operation.

54. (currently amended) The ~~radio transmitting~~ system of claim 51, wherein the energy field includes an EM field or a magnetic field.

55. (currently amended) The ~~radio transmitting~~ system of claim 54, wherein the propagating medium comprises free space in the radio-transmitting range.

56. (currently amended) The ~~radio transmitting~~ system of claim 54, wherein the propagating medium comprises an occlusion in the radio-transmitting range.

57. (currently amended). The ~~radio transmitting~~ system of claim 52, wherein the spread spectrum signal component is a direct sequence spread spectrum (DSSS) signal.

58. (currently amended) The ~~radio transmitting~~ system of claim 52, wherein the spread spectrum signal component is a frequency hopping spread spectrum (FHSS) signal.

59. (currently amended) The ~~radio transmitting~~ system of claim 52, wherein the spread spectrum signal component modulation is Amplitude Shift Keying (ASK).

60. (currently amended) The ~~radio transmitting~~ system of claim 52, wherein the spread spectrum signal component modulation is Frequency Shift Keying (FSK).

61. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein the unique codes of the one or more radio transmitting devices are orthogonal codes.

62. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein the one or more radio transmitting devices are active devices that generate a radio transmitting signal.

63. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein the radio transmitting signal is an EM signal.

64. (currently amended) The ~~radio transmitting~~ system of claim 63, wherein the propagating medium comprises free space in the radio-transmitting range.

65. (currently amended) The ~~radio transmitting~~ system of claim 63', wherein the propagating medium comprises an EM reflecting and conducting layer in the radio-transmitting range.

66. (currently amended) The ~~radio transmitting~~ system of claim 63, wherein the signal receiver means includes a plurality of spaced-apart signal receivers; and the means for determining the

position of each of the one or more radio transmitting devices includes means for calculating the received signal strengths and phase differences of the radio transmitting signals passing through the propagating medium to the plurality of signal receivers.

67. (currently amended) The ~~radio transmitting~~ system of claim 63, wherein the means for decoding and identifying each of the one or more radio transmitting devices includes matched-filtering means for comparing received radio transmitting signals to stored spread spectrum codes of the one or more radio transmitting devices.

68. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein the at least one radio transmitting device comprises a 2-dimensional mouse controller.

69. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein the at least one radio transmitting device comprises a 3-dimensional mouse controller.

70. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein the at least two radio transmitting device comprises a tilting joystick controller.

71. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein the at least two radio transmitting device comprises a "pointer" controller.

72. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein the at least three radio transmitting device comprises a 6-DOF controller.

73. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein the at least two radio transmitting device comprise a gesture interface controller.

74. (currently amended) The ~~radio transmitting~~ system of claim 48, wherein a portion of the radio transmitting devices include a receiver operable to receive wireless instructions to vary operation of the radio transmitting devices.

75 – 82. (cancelled).